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ABSTRACT

A conceptual model of how children process televised information was developed with the goal of identifying those parameters of the process that are both measurable and manipulable in research settings. The model presented accommodates the nature of information processing both by the child and by the presentation by the medium. Presentation is classified into two categories: simultaneous, where all stimuli or items of information are available at the same time; and successive, where the rapid stream of events is organized in its own sequence and does not repeat itself. Two modes are discussed: exploration and search processing. In the exploration mode, the child becomes familiar with the material by devoting attention to whatever is most physically salient or inherently attention getting. In search behavior, the child tries to comprehend the message by actively imposing an order of processing on simultaneous arrays. Similarity of age and viewing experience, and effects of the viewing environment are also discussed. Twenty-one references are cited. (JEG)

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Active vs. Passive Television Viewing:

A Model of the Development of Television Information Processing by Children

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Active vs. Passive Television Viewing

A Model of the Development of Television Information Processing by Children

Most of the research on how children learn from, and process information contained in television programs has been undertaken from one of two perspectives: that of observational learning of behavior from television models, and that of learning factual content and remembering it. Concurrently, most of the experimental work on children's information-getting behavior has focused on exploration, attention, and question-asking behavior in situations where the child has many different kinds of information or stimulus input simultaneously available, and is accordingly free to select and sequence information-getting acts (examining, looking, querying) in whatever manner seems most useful. But when a child is trying to process information contained in a television program, he must accept the structure, sequence, or "syntax" imposed by someone else on a stream of stimulation over time, and the information-processing requirements are logically quite different from those that apply in other situations.

In some ways the processing of televised information is more like receptive processing of language than it is like visual scanning of static environments -- the structure contained in the sequence of inputs has been put there by another, not at random, fortunately, but in accordance with some structural rules implicit in the sequence, and to the extent that a child knows the rules, and the speaker is following them, the communication becomes intelligible. Yet there is an important difference between processing another's speech and processing the stream of information contained in a television program. One can rehearse and eventually master the structure of language because one can actively produce experimental utterances to test one's understanding of the linguistic rules, and the environment will

ordinarily oblige by responding with confirmation, correction, or completion. Thus where one masters receptive language in part by actively producing utterances to test the rules by which the speech of others is to be decoded, there is (as yet) in television viewing no such overt constructive mode in which to learn by doing, or by "dialoging" with the medium.

The fact that a television viewer is behaviorally passive while processing television information has led to a strong skepticism about children's ability to profit cognitively from viewing even the best of television programs (Cook, et al., 1975). This view when coupled with the socially, emotionally, and educationally unsatisfactory nature of the majority of available television fare has led many to discount the constructive and informative potential of the medium, and to regard the immense appeal that television has for children more as an indicator of potentially harmful addiction than as an opportunity to stimulate cognitive growth (Winn, 1977).

It is the purpose of this paper to develop a conceptual model of how children process televised information, with the goal of identifying those parameters of the process that are both measurable and manipulable in research settings. Our model accomodates both the nature of information processing by the child, and the nature of the information presentation by the medium. In addition, we consider the parameters of the viewing situation which may be relevant to the amount of processing done by the child. Our proposal will be based on four initial assumptions:

- (1) The medium of broadcast television has a basic underlying structure, which, like the grammar underlying a language, has a finite set of re-write rules, limited sequential options, and syntactic markers, the understanding of which is critical to processing the information transmitted. While never

entirely content free (syntax is never wholly independent of semantics), such rules and segmental markers are followed by those who script, produce, and edit televised material somewhat independently of the particular content or story line being presented. Accordingly, television viewers, beginning at age two or three, develop the ability to decode what is happening by constructing and revising a cognitive model of the situation in accordance with the grammar of the medium.

(2) Children, like adults, actively process those portions of their stimulus environment to which their attention is devoted from moment to moment, regardless of whether or not that activity appears as observable behavior.

(3) Whatever developmental changes characterize children's cognitive competencies to select, arrange, interpret, and encode information in general should also characterize their processing of televised information at the same ages and stages.

(4) In particular the developmental progression from exploration guided by stimulus salience toward systematic and logical search guided by internally mediated considerations of relevance and informativeness (Wright & Vlietstra, 1975) should be manifest in the development of a child's "media literacy" with respect to television.

Information presentation: simultaneous vs. successive

We have found it useful to employ a four-fold classification of information presentation mode by information processing mode. The two presentation modes are dichotomized for heuristic reasons, and in fact serve to identify a continuum. One mode is simultaneous, static, and spatial; the other by contrast is successive, dynamic, and linear. In the simultaneous mode, all stimuli or items of information are simultaneously available, and

the viewer-processors may attend to any items as often as they like, as slowly as they like, and in any order they like. By contrast, in the successive mode, the viewer-processors experience only one item or event at a time: the rapid stream of events is organized in its own sequence and does not generally repeat itself. Paradoxically processors appear to be more active, selective, and generally in charge of their own deployment of attention in the simultaneous mode as they scan, explore, search, and test hypotheses; the observable behavior of the processor looks a great deal more active in this mode. In the successive mode, however, viewer-processors are required to make just as many decisions, and moreover are making them under more stringent time and memory constraints, though overtly they may not display as much activity and may indeed appear to be entirely passive.

Information processing: exploration and search

The two information processing modes are called exploration and search, and like the presentation modes, probably represent a continuum, rather than pure types. Either processing mode can be employed with either presentation mode, and like the presentation modes, the processing modes also differ on the active-passive dimension. In exploration, the child is getting familiar with the material by devoting attention to whatever is most physically salient or inherently attention-getting. An example of exploration in a simultaneous presentation is the behavior of a young child in a toy store -- his attention drifts from one interesting toy to another in no coherent fashion. Whatever is large, bright, relatively complex, moderately novel, moving, or emitting sound is most likely to engage his interest. In a successive presentation, exploration is equally passive, playful, and consummatory rather than

instrumental. Consider a fourth-of-July fireworks display. One waits for the next event and then enjoys it in proportion to its size, brightness, color variation, movement, complexity, or contrast with what has gone before. And that's it.

Search behavior, however, is more active, deliberate, instrumental, and organized. This processing mode is structured not so much by the stimulus features of the environment that demand attention as by the continuing purposes of the processor as she tries to comprehend and make sense of a logical structure. Therefore the processor actively imposes an order of processing on simultaneous arrays -- an order dictated not by hierarchies of stimulus salience, but by what items of information are needed next by the processor to test her hypotheses or complete her understanding. Attention is sequenced by scanning routines, and items are selected for further processing on the basis of their relevance and informativeness. And the same is true of the active search mode of processing even when the presentation mode is sequential. In that case the activity of the processor may be entirely internal and covert. It would consist of segmenting the stream of events into discrete and meaningful chunks; identifying significant or potentially significant events as they happen; coding, resequencing, and storing them for later retrieval; relating them to what has gone before; supplying missing elements that are implied, but not shown in order to bridge logical gaps; and altering the priorities for selecting future items as new hypotheses about central content are developed and revised. Such activity may still appropriately be termed search behavior although it involves central, rather than peripheral scanning and is not as readily observable.

Our developmental hypothesis is that in television viewing as in static

situations there is a progressive shift with age and viewing experience from perceptual exploration toward logical search (Huston-Stein & Wright, 1977). This hypothesis encompasses a variety of developmental changes in behavior, some of which have been derived from formal theories of cognitive development and some of which have been demonstrated as empirical facts. For example, in Piagetian terms it predicts a shift in comprehension from figurative to operative knowing as a child is liberated from dependence upon the sensorimotor image and becomes able to order, classify, and relate items and events. The hypothesis encompasses the progressive change from egocentric to sociocentric understanding of the behavior of others -- even fictional others (Collins, 1975). Empirically, it is compatible with developmental changes in children's understanding and use of their own mnemonic capacities (Flavell, 1977) and with the developmental trend toward relatively greater central and relatively less incidental recall. Parallel trends in children's attention to televised materials and their ability to organize, segment, and sequence what they have viewed in a logical manner have been reported (Leifer, et al., 1971; Katzman, 1972).

Similarity of age and viewing experience

It has been proposed (Huston-Stein & Wright, 1977; Huston-Stein, 1977) that television viewing responses and skills are as often related to experience with the medium as they are to the chronological age of the child. It is therefore predicted that attentionally salient features (both form and content) will play a relatively larger role in the younger (and/or less experienced) viewer's selection of information for attention and processing. Conversely the older and more experienced viewer makes judgments of relevancy of program events that are based more on their relatedness to what has

gone before and to the child's hypotheses about what is happening, than on their inherent attention-getting qualities as stimulus events. Thus a younger child should attend to and remember isolated events associated with special audio-visual effects, for example, while an older child might concentrate on information supplied by dialogue.

These characteristics of active search do not appear spontaneously according to a maturational timetable -- many of their components are learned and require considerable practice for the achievement of proficiency (Wright, 1977). Moreover, many components of effective search are situation-specific, and the general improvement with age in this mode of processing may result as much from the gradual increase over time in the number and variety of situations in which familiarization has occurred, as it does from maturational changes in cognitive competence. The necessary familiarization process has two components: habituation of attention to inherently salient features and induction of the logical structure of a domain that enables the processor to specify what items or events are most informative or constitute the critical features for comprehension.

Applying this logic to the active processing required in the sequential presentation mode of television, one appreciates at once that both the cognitive level of the child and the intensity and extensity of his opportunities to gain familiarity with the medium will be important determinants of his proficiency. With cumulative viewing experience there is a progressive habituation of attention to merely salient features of form and content, and as a consequence the power of such features to control his attention, and indeed his dependence on them as signals of what is important and memorable are accordingly reduced. Such familiarization by habituation is only the

first step -- it is necessary, but not sufficient, for the second: the induction of the rules that govern the structure of the medium. Such rules are implicit in the recurrent regularity with which certain audio-visual events are used as syntactic markers to segment, sequence, organize, and interrelate the various components of the stream of events portrayed. Examples of such rules are that a fade marks the end of a segment; that a dissolve signals a change of time or place; or that a zoom-in means "consider a designated small part of the scene in greater detail" (see Salomon, 1976). These rules to be used for decoding the television sequence are isomorphic with the encoding rules, that is, the conventions used in scripting, production, and editing of television programs. We must conclude, therefore, that the development of viewing sophistication is heavily dependent upon two processes: habituation of attention to perceptually salient events and induction of the grammar of the medium, both of which are at least as dependent upon the viewing history of the child as they are on her stage of cognitive development.

If both mode of information processing and mode of information presentation are considered, it is apparent that the active processing of sequential material which characterizes the older or more experienced viewer requires increasingly sophisticated techniques which are not needed by one engaged either in passive processing of any information input or in the active processing of a more static environment, where all materials are simultaneously and continuously available for sampling. For example, a viewer in the active sequential condition must be able to encode events as best she can at the time they occur and store them for later processing even when their importance is not clearly marked at the moment of occurrence. In addition, she must take

time to construct hypotheses about the relationships among different bits of program information and continually revise these hypotheses toward a clear concept of the plot - yet simultaneously remain alert and selectively attuned to new information and events continually being presented, and not likely to be repeated at a later time when their significance is clearer.

Obviously, to the extent that this description of active search during television viewing is an accurate one, the behavior of a sophisticated viewer is anything but passive! The exercise of active processing of a sequential medium like television requires complex time-sharing and decision-making at a pace that is inimical to reflective analysis and disruptive to attentional continuity. Our task then is to discover how a young child comes to be able to engage in this difficult processing, and the conditions under which he is most likely to exercise that competence effectively.

Effects of the viewing environment

To this point we have suggested that the child's attention to and comprehension of the medium is affected by the nature of the information presentation and by both his cognitive level in general terms (age, stage, M.A., and the like) and variety and amount of viewing history. Older and more broadly experienced viewers will show more selective attention to major content theme-related events, better integration and recall of central content, and relatively less attention to and recall of those "window-dressing" features of both form and content that are incidental to main themes and are inserted primarily as attention-getting and interest-maintaining gimmicks than will younger and/or less experienced viewers. In addition, the more competent viewers will be better able to reconstruct from memory the actual, logical, and causal sequences of events that comprise a story or message than will less

competent viewers.

We would now like to suggest that specific factors within what we term the viewing environment may also be relevant to what children process from a televised presentation. The viewing environment as used in this paper refers not only to the physical and social setting in which the television is watched, but to characteristics of specific programs which, for some reason, the child has chosen to watch.

Anderson, Alwitt, Lorch, and Levin (1978) have specified non-content attributes of the television program itself which they have observed to control children's visual attention. Many of these, and others more closely related to content, also determine the effectiveness with which children process information. Here we would distinguish the features of content from the formal attributes of audio and visual production. Beyond the general type of program format (situation comedy, sports, adventure drama, variety show, educational and documentary program, cartoon, news and special events, etc.), there is important variability in the complexity of content, the redundancy of key themes, and the entropy (pace, variability, unpredictability, novelty) of the formal features used (Watt & Krull, 1972). For example, an investigation of children's processing of prosocial messages (CBS Research, 1974) showed that many 7- and 8-year-olds were able to understand at least one of a variety of messages presented on "Fat Albert and the Cosby Kids", but that this ability was combined with a propensity to confuse or misunderstand some of the other messages. The ability to discern and correctly interpret the major messages increased with age. It has also been shown that young children have difficulty in clustering, sequencing, and recalling central plot material (Collins, 1975). However, programs which contain little or no

plot and a small number of situations whose perceptual salience is highly correlated with their relevance to the plot should be easier to process for younger and less experienced viewers, than are programs which require an ability to perceive, understand, sequence, and integrate a number of on-going plot-related events, which ignoring salient, but uninformative gimmicks. To the extent that logical re-sequencing is needed (events must be perceived as having occurred in a sequence different from that in which they were shown) or that gap-filling is needed (ability to infer and supply from general knowledge those intervening events that are logically necessary, but not actually shown), then obviously only the more competent viewer will succeed in fully comprehending the content.

In the domain of formal (noncontent) features there are also a number of important determinants of successful processing. Where formal features which are novel, infrequent, unpredictable, and not semantically or syntactically related to the story in readily discernable ways are used, they should distract the younger or less-experienced viewer and interfere with his processing of central content. Conversely, where such features are used sparingly and appropriately to highlight major content themes, they should facilitate the selective attention of the less competent viewer. Both their interfering effects and their facilitating effects on attention should be less marked with more competent viewers. Results of a recent experiment in our laboratory appear to support these contentions (Watkins, et al., 1978, Report A). Children at two age levels (average ages 5 years and 9 years) viewed a short cartoon, and then completed a series of questions which assessed program comprehension through immediate recall. These questions were drawn from portions of the program which varied both in type of content presented (central,

incidental) and in use of formal features for presenting such content (high levels, low levels). Older viewers recalled central and incidental material well at both levels of formal feature use. Younger viewers, however recalled only incidental material equally well at both formal feature levels. Central content was recalled well only when such content was made salient by high levels of formal features. Salomon (1976) has also demonstrated that such formal features as zooms and pans, when used as visual analogs of the required thinking processes, can serve to supplant those processes when they are deficient or to evoke them when they are within the child's repertoire.

In some formats it is possible to present verbal queries directly to the viewing audience or to provide a pause in the action during which reflection on the content or a choice among alternative conclusions can be made by the viewer. Dennis (1977) has demonstrated the effectiveness of such pauses and queries for preschoolers' comprehension of sorting and classification segments from Sesame Street.

One additional program parameter that appears to be crucial is continuity. Continuity refers to the degree to which a program or series over many weeks and many episodes provides sufficient homogeneity of settings, characters, and background assumptions that each episode can be based in part on the assumption that the viewer knows the background of what is going on without having to be reoriented. Programs and series that are high in continuity of content can be less redundant and more subtle without loss of viewer comprehension. In general the less a viewer has to learn about new persons, relationships, and settings, and the more familiar are the continuing plots, the easier it is for the viewer to use these features as segmental and interpretive markers in

decoding the content. Again, however, the same high level of continuity that may enable younger and less experienced viewers to comprehend more effectively may also satiate the interest and habituate the attention of more sophisticated viewers.

A final set of determinants are the characteristics of the setting in which a child views television. Among the properties that should facilitate comprehension are four parameters of the viewing situation: one is the presence of others who are older, more experienced, or better informed and who are willing to answer questions raised by a child as she views the program. A second is the behavior of others who, through appropriate comments and questions timed so as not to interrupt at critical moments, can model and/or elicit relevant verbal labeling and elaboration of the televised content by the child (Friedrich & Stein, 1975). The advantage is not that another person does the processing for the child, but that the child's depth of processing the material is enhanced (Craik & Lockhart, 1972). A perhaps obvious third facilitative condition is the degree to which the child has been prepared to process the content of a particular program by the sort of advance information one gets from having viewed a preceding episode, read about the program in a review or advanced publicity, or seen promotional televised material advertising the program before its occurrence. School-age children experience considerable social pressure to view programs about which they have heard a great deal from their peers, and at the same time often appear to know a lot about programs they have never seen, presumably via conversation with peers. A final facilitator for processing program information is the opportunity to enact in fantasy, or to rehearse in role-play the plots, characters, and situations portrayed in a television program

(Friedrich & Stein, 1975).

Obviously there are also situational characteristics that can easily detract from the comprehension of program content. Inappropriate or poorly-timed queries from others and their irrelevant social and verbal behavior constitute a powerful source of distraction. Similarly other ongoing events and activities which can preempt either the child's visual or auditory attention will have analogous interfering effects, especially on younger viewers. We are presently engaged in a program of research on the effects of the parameters of the viewer, the medium, and the total viewing situation. For example, in a series of studies, the attention of preschool, and third- and fourth-grade children to commercially produced cartoons is being analyzed (Watkins, et al., 1978, Reports 6 and 9). Additionally, the attention of older children to educational episodes is being studied. With these data we hope to provide a description of children's attention which will include the effects of age and viewing experience, the effects of specific program formats, and the powers of specific formal features to direct and maintain interest and attention.

In another study (Greer, et al., 1978, Report 7) we are examining the effects of varying both the level of formal feature use and the temporal placement of commercials within children's programs. Information both on children's differential perception of commercials and programs, and on their attention relative to the level of perceptual salience have resulted from this investigation.

In a third study (Watkins, et al., 1978, Report A), children at several age levels watched a program in one of several viewing conditions which varied the amount and type of additional information they received about

program content. Later, their understanding of specific content was assessed. We hope this research will provide further indications about both the effects of the viewing situation, and how these effects interact with the level of formal features used in presentation of content, to influence children's understanding of televised presentations.

To the extent that research on these parameters of the viewer, the televised material (both content and form), and the viewing situation establishes the optimal conditions for the development of active, successive, salience-resistant, and rule-governing processing of televised material, we see no reason why children's learning and thinking may not be enhanced by the viewing of good quality television programs. Indeed, because the vast majority of American children between the ages of three and eighteen are sure to encounter television at least several hours per day no matter what we do as parents, teachers, scientists, counselors, or lobbyists, we might well devote some of our energies to optimizing those encounters as occasions for cognitive growth.

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